

What is claimed:

1. A method of testing for an allergic disease, said method comprising the steps of:

5 a) measuring the expression level of a TR3 or TINUR receptor protein, or a gene encoding the TR3 or TINUR receptor protein, in eosinophil cells of a test subject; and

 b) comparing the expression level of the protein or gene in the eosinophil cells of the test subject with an expression level in
10 eosinophil cells of a healthy subject.

2. The testing method of claim 1, wherein the gene expression level is measured by cDNA PCR.

15 3. The testing method of claim 1 or 2, wherein the allergic disease is atopic dermatitis.

4. A reagent for testing for an allergic disease, said reagent comprising an oligonucleotide of at least 15 nucleotides in length
20 that comprises a nucleotide sequence complementary to a polynucleotide encoding a TR3 or TINUR receptor protein, or to its complementary strand.

5. A method of detecting the influence of a candidate compound on
25 the expression level of a polynucleotide of (a) or (b) below, wherein said method comprises the steps of:

 (1) contacting the candidate compound with a cell that expresses a polynucleotide of (a) or (b):

 (a) a polynucleotide encoding a TR3 or TINUR receptor protein;
30 and

 (b) a polynucleotide encoding a protein whose expression in the eosinophils of an atopic dermatitis patient is increased, wherein said polynucleotide hybridizes under stringent conditions with a polynucleotide encoding a TR3 or TINUR receptor protein; and

35 (2) measuring the expression level of the polynucleotide of (a) or (b).

6. The method of claim 5, wherein the cell is from a leukocyte cell line.

5 7. A method of detecting the influence of a candidate compound on the expression level of a polynucleotide of (a) or (b) below, wherein said method comprises the steps of:

(1) administering the candidate compound to a test animal; and

10 (2) measuring the expression intensity of a polynucleotide in the eosinophil cells of the test animal, wherein the polynucleotide is selected from (a) or (b):

(a) a polynucleotide encoding a TR3 or TINUR receptor protein; and

15 (b) a polynucleotide encoding a protein whose expression in the eosinophils of an atopic dermatitis patient is increased, wherein said polynucleotide hybridizes under stringent conditions with a polynucleotide encoding a TR3 or TINUR receptor protein.

20 8. A method of screening for a compound that increases the expression level of the polynucleotide (a) or (b), wherein said method comprises the steps of detecting the influence on expression level by the method of any one of claims 5 to 7, and selecting a compound that increases that expression level as compared to a control.

25 9. A method of detecting the influence of a candidate compound on the expression level of a polynucleotide encoding a TR3 or TINUR receptor protein, wherein said method comprises the steps of:

30 (1) contacting a candidate compound with a cell or cell extract containing a DNA comprising a structure such that a reporter gene and the transcription regulatory region of a gene encoding a TR3 or TINUR receptor protein are operably linked; and

(2) measuring the activity of the reporter gene.

35 10. A method of screening for a candidate compound that increases the expression level of a gene encoding a TR3 or TINUR receptor protein, wherein said method comprises the steps of detecting the influence

of a compound on the activity of the reporter gene by the method of claim 9, and selecting a compound that increases the activity compared to a control.

5 11. A method of screening candidate compounds for a therapeutic agent for an allergic disease, wherein said method comprises the steps of:

1) contacting a test compound with a TR3 or TINUR receptor protein;

10 2) measuring the binding activity between the test compound and the TR3 or TINUR receptor protein; and

3) selecting the compound that binds to the TR3 or TINUR receptor protein.

15 12. A method of screening candidate compounds for a therapeutic agent for an allergic disease, wherein said method comprises the steps of:

1) providing cells transfected with (a) a DNA that can express a fusion protein of a TR3 or TINUR receptor protein or its ligand binding domain and a transcription regulatory region binding protein, and (b) a DNA having a reporter gene is operably linked downstream of a DNA sequence to which the transcription regulatory region binding protein binds;

2) contacting the cell with the test compound;

3) measuring the activity of the reporter gene; and

4) selecting the compound that changes this activity.

25 13. A therapeutic agent for an allergic disease, said agent comprising, as an active ingredient, a compound obtainable by the screening method of any one of claims 10 to 12.

30 14. A therapeutic agent for an allergic disease, said agent comprising, as an active ingredient, a prostaglandin comprising a cyclopentenone structure and that is obtainable by the screening method of any one of claims 10 to 12.

35 15. A therapeutic agent for an allergic disease, said agent comprising, as an active ingredient, a ligand of a TR3 or TINUR

receptor.

16. The therapeutic agent for an allergic disease of claim 15, wherein the ligand of a TR3 or TINUR receptor is a prostaglandin comprising a cyclopentenone structure.

17. The therapeutic agent for an allergic disease of claim 16, wherein the prostaglandin having a cyclopentenone structure is selected from the group consisting of prostaglandin A₂, prostaglandin A₁, 15-epi prostaglandin A₁, 15(R)-15-methyl prostaglandin A₂, 16-phenoxy tetranor prostaglandin A₂, 17-phenyl trinor prostaglandin A₂, 15-deoxy-delta 12,14-prostaglandin A₁, 15-deoxy-delta 12,14-prostaglandin J₂, and 8-isoprostaglandin A₁.

18. The therapeutic agent for an allergic disease of claim 15, wherein the ligand of a TR3 receptor is any one of the compounds listed in Tables 14 to 49.

19. The therapeutic agent for an allergic disease of any one of claims 13 to 18, wherein the allergic disease is atopic dermatitis.

20. An animal model for an allergic disease, wherein the animal is a transgenic non-human vertebrate in which the expression intensity of polynucleotide (a) or (b) below is decreased in eosinophil cells:

(a) a polynucleotide encoding a TR3 or TINUR receptor protein; and

(b) a polynucleotide encoding a protein whose expression in the eosinophils of an atopic dermatitis patient is increased, wherein said polynucleotide hybridizes under stringent conditions with a polynucleotide encoding a TR3 or TINUR receptor protein.

21. The animal model of claim 20, wherein the transgenic animal is a knockout animal.

22. A method of inducing cell apoptosis, said method comprising activation of a TR3 or TINUR receptor protein in the cell.

23. The apoptosis induction method of claim 22, which comprises the step of contacting a cell with a compound that is obtainable by the screening method of any one of claims 10 to 12, or a prostaglandin comprising a cyclopentenone structure.

24. The apoptosis induction method of claim 22 or 23, wherein said cell is an eosinophil cell.

25. An apoptosis-inducing agent, which comprises a compound or a prostaglandin comprising a cyclopentenone structure and that is obtainable by the screening method of any one of claims 10 to 12.

26. An apoptosis-inducing agent comprising a ligand of a TR3 or TINUR receptor as an active ingredient.

27. The apoptosis-inducing agent of claim 26, wherein the ligand of the TR3 or TINUR receptor is a prostaglandin comprising a cyclopentenone structure.

28. The apoptosis-inducing agent of claim 27, wherein the prostaglandin comprising a cyclopentenone structure is selected from the group consisting of prostaglandin A₂, prostaglandin A₁, 15-epi prostaglandin A₁, 15(R)-15-methyl prostaglandin A₂, 16-phenoxy tetranor prostaglandin A₂, 17-phenyl trinor prostaglandin A₂, 15-deoxy-delta 12,14-prostaglandin A₁, 15-deoxy-delta 12,14-prostaglandin J₂, and 8-isoprostaglandin A₁.

29. The apoptosis-inducing agent of claim 26, wherein the ligand of the TR3 receptor is any one of the compounds listed in Tables 14 to 49.

30. A TR3 or TINUR gene expression-inducing agent, which comprises a ligand of an eosinophil CD30 receptor.